

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

PIPELINE

(Feet)

CODE 516

DEFINITION

Pipeline having an inside diameter of 8 inches or less.

PURPOSE

To convey water from a source of supply to points of use for livestock, wildlife, or recreation.

CONDITIONS WHERE PRACTICE APPLIES

Where it is desirable or necessary to convey water in a closed conduit from one point to another, to conserve the supply, or for reasons of sanitation.

CRITERIA

Capacity: For livestock water, the installation shall have a capacity to provide seasonal high daily water requirements of at least 30 gallons per day per Animal Unit (AU = 1000 lb. live weight) for the number and species of animals to be supplied. Additional requirements can be obtained from the NRCS National Range and Pasture Handbook, Chapter 6.

For recreation areas, the water capacity shall be adequate for all planned uses. Typical examples are drinking water, fire protection, showers, flush toilets, and irrigation of landscaped areas.

Additional water capacity will be provided for wildlife when applicable.

Sanitary protection: If water from the pipeline is to be used for human consumption, applicable State of Illinois and local regulations

shall be met.

When a pipeline serving livestock is supplied from a utility that provides potable water, an approved method for eliminating backflow will be installed. Contact the water supplier for appropriate installation recommendations.

Pipe: All pipe must withstand the pressure it will be subjected to, including hydraulic transients, internal pressures and external pressures. As a safety factor against surge or water hammer, the working pressure should not exceed 72% of the pressure rating of the pipe and the design flow velocity at system capacity should not exceed 5 ft/sec. If either of these limits is exceeded, special consideration must be given to flow conditions and measures must be taken to adequately protect the pipeline against surge.

Steel pipe shall meet the requirements of AWWA Specification C200.

Plastic pipe, fittings, and solvents shall conform to the requirements of the ASTM specifications in Tables 1, 2 and 3, as applicable.

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

Drainage: Valves or unions shall be installed at low points in the pipeline so that the line can be drained as needed. Check valves shall be installed as needed to protect groundwater quality or maintain a full pipeline.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.

Table 1. Plastic pipe specifications

| ASTM Spec. | Plastic pipe |
|-------------------|--|
| D 1527 | Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80 |
| D 1785 | Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 |
| D 2104 | Polyethylene (PE) Plastic Pipe, Schedule 40 |
| D 2239 | Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter |
| D 2241 | Poly(Vinyl Chloride) (PVC), Pressure-Rated Pipe (SDR) |
| D 2282 | Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR) |
| D 2447 | Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside |
| D 2513 | Thermoplastic Gas Pressure Pipe, Tubing and Fittings |
| D 2737 | Polyethylene (PE) Plastic Tubing |
| D 2672 | Joints for IPS PVC Using Solvent Cement |
| D 3035 | Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter |
| ¹ C900 | Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches |
| ¹ C901 | Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches |

¹AWWA Specification**Table 2. Plastic pressure pipe fitting specifications**

| ASTM Spec. | Plastic pressure pipe fittings |
|------------|---|
| D 2464 | Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80 |
| D 2466 | Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 |
| D 2467 | Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80 |
| D 2468 | Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40 |
| D 2609 | Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe |
| D 2683 | Socket-Type Polyethylene Fittings for Outside Diameter-Controlled |
| D 3139 | Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals |
| D 3261 | Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) |

Table 3. Solvents for solvent-welded plastic pipe joints

| ASTM Spec. | Solvents |
|------------|--|
| D 2235 | Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe |
| D 2564 | Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings |
| D 2855 | Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings |

Vents: The design shall provide for entry and removal of air along the pipeline, as needed, to prevent air locking or pipe collapse. If parts of the line are above the hydraulic gradient, periodic use of an air pump may be required. Provisions shall be made for pressure relief, air relief and vacuum relief as needed to protect the pipeline.

Joints: Watertight joints that have a strength equal to that of the pipe shall be used. Couplings must be of material compatible with that of the pipe. If they are made of material susceptible to corrosion, provisions must be made to protect them.

Protection: When steel pipe is used, interior protective coatings shall be provided in accordance with NRCS Conservation Practice Standard 430FF, Steel Pipe. If a coal-tar enamel protective coating is needed for corrosion protection, the coating shall meet the requirements of AWWA Specification C203.

Steel pipe installed above ground shall be galvanized or shall be protected with a suitable protective paint coating, including a primer coat and two or more final coats.

Plastic pipe installed above ground shall be resistant to ultraviolet light throughout the intended life of the pipe.

All pipes shall be protected from hazards presented by traffic, farm operations, freezing temperatures, fire, thermal expansion and contraction. Reasonable measures should be taken to protect the pipe from potential vandalism.

Vegetation: Disturbed areas shall be established with vegetation or otherwise stabilized as soon as practical after construction. Seedbed preparation, seeding,

fertilizing, and mulching shall conform to NRCS Conservation Practice Standard 342, Critical Area Planting.

CONSIDERATIONS

All pipelines will be buried below frost line or otherwise protected from freezing. If the pipeline cannot be protected from freezing, valves will be properly located so the pipe can be drained during periods of freezing temperatures.

The visual design of pipelines and appurtenances in areas of high public visibility shall be carefully considered.

PLANS AND SPECIFICATIONS

Plans and specifications for installing pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the pipeline is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

The Engineering Field Handbook, chapter 5, will guide the development of plans.

OPERATION AND MAINTENANCE

An O&M plan specific to the type of installed pipeline shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- Protecting pipeline from damage by farm equipment, vehicles, and livestock;
- Checking for leaks and improper operation. Repair any damage as soon as possible;
- Repairing any eroded areas that are hazardous to the pipeline. Reestablish vegetative cover immediately where erosion has occurred;
- Marking pipeline locations in areas where potential damage could occur by other activities;
- Recording on a map the location of pipeline and approximate depth;
- Checking to ensure needed volume of water is being supplied at the design pressure;
- Opening/closing valves to prevent excessive water hammer;
- Inspecting and testing valves, pressure regulators, pumps, switches and other appurtenances;
- Checking for debris, minerals, algae and other materials which may restrict system flow; and
- Draining and/or providing for cold weather operation of the system.

REFERENCES

Engineering Field Handbook

PIPELINE SPECIFICATIONS

General: Construction operations shall be carried out in a manner and sequence so that erosion and air /water pollution are minimized and held within legal limits.

The completed job shall present a workmanlike appearance and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used. The contractor shall be assured that all state laws concerning buried utilities have been met.

All trees, stumps, roots, brush, weeds, and other objectionable materials shall be removed from the designated work area.

Materials: Materials and fabrication shall be as specified on the drawings. Plastic pipe 2 inches or less in diameter meeting ASTM specifications D1785, D2239, D2241, or AWWA C901 may be used. Plastic pipe over 2 inches in diameter shall be polyvinyl chloride (PVC) 1120 or 1220, conforming to ASTM D1785 or D2241. Other plastic pipe meeting IL-NRCS Conservation Practice Standard 516 (Pipeline) is acceptable. The ASTM or AWWA designation shall be stamped on the pipe. Steel pipe shall meet AWWA specification C200.

To ensure adequate strength, pipe with a minimum pressure rating of 150 lb/in² shall be used when burying the pipe or working with systems that operate at over 50 lb/in².

Placement: Placement of the pipeline shall be as shown on the plans or as staked. The pipe shall be free of dirt and other materials before assembling. Flexible plastic pipe shall be placed in a "snake-like" position in the trench to provide expansion and contraction with temperature change.

Other parts of the water system shall be installed and connected to the pipeline as specified.

Pipelines shall be placed so that they are protected against hazards imposed by traffic, farm operations, freezing temperatures, or soil cracking. Minimum depth of burial shall be as

shown on drawings. Unless otherwise specified, plastic pipe shall be buried at least 24 inches for ordinary field traffic. When crossing under a road, pipeline shall be buried deeper or protected from collapsing by placing in a steel or concrete conduit.

Other means of protection must be provided if the depth required for protection is impractical because of shallow soils over rock or for other reasons. Abrupt changes in grade must be avoided to prevent damage to pipe.

Pipelines shall be buried below frost line or otherwise protected from freezing. If pipeline cannot be protected from freezing, the pipeline will be provided with valves properly located so the pipe can be drained during periods of freezing temperatures.

Trenches for plastic pipelines shall be free of rocks and other sharp-edged materials, and pipe shall be carefully placed to prevent damage. Flexible plastic pipelines may be placed by plow-in equipment if soils are suitable and rocks and boulders will not damage the pipe material.

All PVC pipe connections designed to be glued will use PVC solvent cement. Allow glue to cure according to manufacturer's guidelines prior to moving pipe and pressure testing. Gluing shall not be done at temperatures below freezing.

Testing: Pipelines shall be pressure tested before backfilling by one of the following methods.

Method 1: The pipe shall be filled with water and tested at design working pressure or a minimum head of 10 feet (4.3 lb/in²), whichever is greater. All leaks shall be repaired and the test repeated.

Method 2: The pipe shall be filled with water and pressure tested at the working pressure for 2 hours. The allowable leakage shall not be greater than 1 gallon per diameter inch per mile. If the test exceeds the allowable rate, the defect shall be repaired until retests show that the leakage is within the allowable limits, except that all visible leaks shall be repaired.

Backfilling: All backfilling shall be completed before the line is placed in service. For plastic or copper pipe, the initial backfill shall be of selected material that is free from rocks or

other sharp-edged material that can damage the pipe. Deformation or displacement of the pipe must not occur during backfilling.

Plastic pipelines installed by the plow-in method require surface compaction and shaping in addition to the normal plow-in operations.

Mound soil over pipe to allow for settlement. Provisions shall be made for stabilizing disturbed areas and controlling erosion, as necessary.

Vegetation: Topsoil shall be added, if needed, to establish vegetation. Refer to Critical Area Planting, NRCS Practice Code 342 or equivalent for seeding and mulching recommendations.